UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER OF PATENTS AND TRADEMARKS
Washington, D.C. 20231
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/734,467	12/11/2000	Gerhard Beitel	INF-P80224 US	5119

7590 03/13/2003

LERNER AND GREENBERG, P.A.
POST OFFICE BOX 2480
HOLLYWOOD, FL 33022-2480

EXAMINER
BROPHY, JAMIE LYNN

ART UNIT	PAPER NUMBER
2822	

DATE MAILED: 03/13/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 09/734,467	Applicant(s) BEITEL ET AL.
	Examiner J. L. Brophy	Art Unit 2822

-- Th MAILING DATE of this communication app ars on th cover sh et with the correspond nce address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *21 January 2003* .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-35* is/are pending in the application.

4a) Of the above claim(s) *8-10,14,16,18 and 25-35* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-3,5,7,11-13,15,17 and 19-23* is/are rejected.

7)☒ Claim(s) *4,6 and 24* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *11 December 2000* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) *6, 8, 13* .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other:

DETAILED ACTION

This office action is in response to the election filed 1/21/03.

Election/Restrictions

Applicant's election without traverse of claims 1-7, 11-13, 15, 17 and 19-24 in Paper No. 14 is acknowledged.

Claims 8-10, 14, 16, 18 and 25-30 are withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected species, there being no allowable generic or linking claim. Election was made **without** traverse in Paper No. 14.

Claim Objections

Claims 12, 17, 20 and 22 are objected to because of the following informalities:

In claim 12, line 3, "Pt and/or is Ir" should be "and/or is Ir".

In claim 17, line 1, the antecedent basis for the limitation "the layer" is unclear since there is more than one layer recited in claim 1. The limitation in claim 17 should be "the alloy layer".

In claim 20, line 2, the antecedent basis for the limitation "abrasive particles" is unclear since the limitation "abrasive particles" is recited in claim 19. In claim 20, line 2, "abrasive particles" should be "the abrasive particles".

In claim 22, line 2, the antecedent basis for the limitation "oxidant" is unclear since the limitation "at least one oxidant" is recited in claim 19. In claim 22, line 2, "oxidant" should be "the at least one oxidant".

Appropriate correction is required.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 1-3, 7, 11-13 and 15 rejected under 35 U.S.C. 102(b) as being anticipated by Miyata et al (5,500,559).

Miyata et al teach a method that comprises providing a prestructured substrate 11, 12, 13;

Applying to the prestructured substrate a precious metal 15 and a donor material 14 containing an additive which is not a precious metal in two or more layers, wherein the precious metal 15 is Pd and the donor material 14 is Ti;

Subjecting the layers 14, 15 to heat treatment at a temperature of approximately 700 °C, such that the additive diffuses into the precious metal and an alloy layer 18 is produced (col. 3, lines 25-30); and

Polishing the alloy layer 18 by CMP,

Wherein the donor material 14 is applied to the substrate before the precious metal 15, and

Wherein the thickness of the donor material 14 is selected such that during heat treatment the donor material essentially diffuses completely into the precious metal 15.

See Figs. 2A-2D and accompanying text.

Claims 1, 5, 13 and 17 are rejected under 35 U.S.C. 102(e) as being anticipated by Nogami et al (6,022,808).

Nogami et al teach a method that comprises providing a prestructured substrate;

Applying to the prestructured substrate 10 a precious metal 13 and a donor material 14 containing an additive which is not a precious metal in two or more layers, wherein the additive Pd or Ta (col. 5, lines 23-27);

Subjecting the layers 13, 14 to heat treatment at a temperature of approximately 300 °C – 500 °C, such that the additive diffuses into the precious metal 13 and an alloy layer 20 is produced; and

Polishing the alloy layer 20 by CMP,

Wherein the precious metal 13 is applied to the substrate before the donor material 14, and

Wherein the alloy layer 20 contains between approximately 0.3% and approximately 6% of the donor material (col. 5, lines 48-50).

See Figs. 1-3 and accompanying text.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1-3, 7, 11-13 and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kawakubo et al (5,952,687) in view of Azuma et al (5,708,302).

Kawakubo et al teach a method that comprises providing a prestructured substrate 1;

Applying to the prestructured substrate a precious metal 13 to serve as a bottom electrode; and

Polishing the precious metal 13.

See, for example, Figs. 4B to 4D and 6 and accompanying text.

However, Kawakubo et al do not teach that the bottom electrode is formed by applying a precious metal and a donor material and subjecting the layers to a heat treatment.

Azuma et al teaches a method for forming a bottom electrode that comprises forming a Ti or Ta (donor material) layer 34 followed by forming a Pt (precious metal) layer 36; subjecting the layers to heat treatment at a temperature of between approximately 450 °C and approximately 1000 °C (col. 8, lines 37-40), such that the Ti or Ta layer 34 diffuses into the Pt layer and an alloy layer 38 is produced, wherein the thickness of the donor material is selected such that during heat treatment the donor

material essentially diffuses completely into the precious metal (col. 5, lines 11-14). See Fig. 1 and accompanying text.

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to modify the method disclosed by Kawakubo et al by forming the bottom electrode using the method taught by Azuma et al because a person of ordinary skill in the art at the time the invention was made would have been motivated to use the method taught by Azuma et al in order to form a bottom electrode that adheres well to the underlying layers and does not have short-inducing surface irregularities (see Azuma et al, col. 1, lines 53-59).

Claims 19-21 and 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kawakubo et al in view of Azuma et al as applied to claims 1-3, 7, 11-13 and 15 above, and further in view of Russell et al (6,395,194).

Kawakubo et al in view of Azuma et al teach a method that comprises forming a precious metal layer and a donor material layer, performing a heat treatment, and performing CMP to form a bottom electrode.

However, Kawakubo et al in view of Azuma et al do not specifically teach the composition of the CMP slurry.

Russell et al teach a CMP slurry for polishing a precious metal layer that comprises water (col. 3, line 7), abrasive particles (col. 4, line 65 through col. 5, line 19), at least one oxidant (col. 5, lines 25-29) and at least one stabilizer (col. 5, lines 28-30),

wherein Al_2O_3 particles or SiO_2 particles having a size of approximately 50-300 nm are used as the abrasive.

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to modify the method disclosed by Kawakubo et al in view of Azuma et al by using a CMP slurry composition such as that taught by Russell et al because a person of ordinary skill in the art at the time the invention was made would have been motivated to use the slurry taught by Russell et al in order to selectively remove the noble metal layer during CMP (see Russell et al, col. 2, lines 29-33).

Claims 19, 20 and 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kawakubo et al in view of Azuma et al as applied to claims 1-3, 7, 11-13 and 15 above, and further in view of Kirlin et al (5,976,928).

Kawakubo et al in view of Azuma et al teach a method that comprises forming a precious metal layer and a donor material layer, performing a heat treatment, and performing CMP to form a bottom electrode.

However, Kawakubo et al in view of Azuma et al do not specifically teach the composition of the CMP slurry.

Kirlin et al teach a CMP slurry for use in a capacitor structure that comprises water, Al_2O_3 or SiO_2 abrasive particles and at least one oxidant , wherein the oxidant is H_2O_2 (col. 5, lines 16-25).

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to modify the method disclosed by Kawakubo et al in view of

Azuma et al by using a CMP slurry composition such as that taught by Kirlin et al because a person of ordinary skill in the art at the time the invention was made would have been motivated to use the slurry taught by Kirlin et al in order to effectively remove the metal and dielectric materials that are commonly used in capacitor structures (see Kirlin et al, col. 4, lines 11-22).

Allowable Subject Matter

Claims 4, 6 and 24 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The following is an examiner's statement of reasons for allowance: none of the references of record teach all of the process limitations as claimed. Specifically, none of the references teach a method that comprises applying several layers of the precious metal alternately with the donor material, in combination with the other claim limitations. Re claim 24, none of the references teach a CMP slurry that comprises polyacrylic acid as a stabilizer, in combination with the other claim limitations.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to J. L. Brophy whose telephone number is (703) 308-6182. The examiner can normally be reached on M-F (8:00-5:00).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Amir Zarabian can be reached on (703) 308-4905. The fax phone numbers

for the organization where this application or proceeding is assigned are (703) 872-9318 for regular communications and (703) 872-9319 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

J.L.B.

jlb
March 7, 2003

AMIR ZARABIAN
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2800